Control fire ants by using Decapitating flies

Mississippi State University Extension Service

Black and red imported fire ants (*Solenopsis richteri* and *Solenopsis invicta*) came into the U.S. at the Port of Mobile, Alabama, around 1918 and again in 1938. Efforts to eradicate these pests with chemical insecticides in the 1960s and '70s were unsuccessful. These efforts may have even helped spread them by killing native ants.

Recently interest has shifted toward more long-term, environmentally friendly means of controlling fire ants. Decapitating flies (family Phoridae, genus *Pseudacteon*) are one potential tool in the long-term fight to reduce fire ant populations in the U.S. through biological control – pitting one organism (in this case a parasitic fly) against a pest.

Decapitating flies are deadly enemies of fire ants. These tiny flies (some species less than 1 millimeter across) attack fire ants that are out of the nest foraging for food, defending the colony, or responding to nest disturbances. The flies are parasitoids; that is, the immature fly (maggot) feeds on the host (fire ant), killing it in the process. The female fly quickly injects a single egg into a fire ant worker. When the egg hatches, the maggot migrates to the ant's head, where it continues to develop and eventually eats the brain and muscles. The head falls off, and the developing fly remains in the head capsule as a pupa. After a couple of weeks, a new adult fly emerges, and the cycle begins again.

In South America only about 1 percent of fire ants are parasitized by phorids. However, when foraging fire ants are attacked by phorid flies, they assume defensive postures, trying to avoid the flies' attacks instead of gathering food. It is hoped that interfering with the day-to-day activities of fire ants by importing parasitic phorid flies will tip the ecological balance more in favor of native ant species (some of which already have native phorid species of their own to contend with!). Different species of phorid flies attack different sizes of ants, so researchers hope to import and establish several species of phorids for maximum effectiveness against fire ants.

More than 20 phorid fly species have been shown to attack fire ants in South America. Two species are currently being reared and released against fire ants in the U. S. – *Pseudacteon tricuspis* and *Pseudacteon curvatus*. Extensive testing has shown these flies are not attracted to humans or animals and do not harm insects other than fire ants. Additionally, adult flies are not attracted to vegetables (12 kinds), fruit (13 kinds), raw meat (7 kinds), prepared foods (12 kinds), carrion (2 kinds), or dung (6 kinds). Tests were designed to determine whether the flies might become pests of food or vectors of disease. In all cases the flies showed virtually no interest in the substances tested.

Decapitating fly

Fly approaching ant to lay egg

Decapitated fire ant

Fly larva emerging from head capsule

Researchers at Mississippi State are cooperating with researchers in Gainesville, Florida to rear and study *Pseudacteon curvatus*. This species will be released at large test sites against hybrid and black imported fire ants. The 300-acre test areas will be treated with conventional fire ant baits, and surrounded by untreated zones where biological control agents (including decapitating flies) will be released. It is hoped these agents will slow any reinfestation.

Researchers have demonstrated the negative impact phorids can have on competitive abilities of fire ants in small-scale experiments. Incorporating phorid fly releases into area-wide fire ant management programs in Mississippi and other southern states will let researchers examine the impact of phorid flies on fire ants in large-scale, natural situations. Since the flies are self-perpetuating, limited releases in selected areas should result in phorids eventually pressuring, and hopefully decreasing, fire ant populations in their range in the U.S.

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